DOCUMENT RESUME

ED 219 268 SE 038 775

TITLE	Lessons from an Energy Curriculum for the Senior High Grades. Teacher Guide - Indiana High School Energy Units. Energy Education Curriculum Project.
INSTITUTION	Indiana State Dept. of Commerce, Indianapolis. Energy Group.; Indiana State Dept. of Public Instruction, Indianapolis. Div. of Curriculum.
SPONS AGENCY	Department of Energy, Washington, D.C.
PUB DATE	Apr 82
GRANT	DE-F645-76CS-60038
NOTE	75p.; For related documents, see SE 038 776-784.
EDRS PRICE	MF01/PC03 Plus Postage.
DESCRIPTORS	*Conservation Education; *Energy Conservation; Environmental Education; High Schools; *Interdisciplinary Approach; *Learning Activities; Program Descriptions; Science Activities; *Science Curriculum; Science Education; *Secondary School Curriculum; Teaching Guides; Units of Study
IDENTIFIERS	*Energy Education; Indiana

ABSTRACT

Energy education units (consisting of a general teacher's guide and nine units containing a wide variety of energy lessons, resources, learning aids, and bibliography) were developed for the Indiana Energy Education Program from existing energy education materials. The units were designed to serve as an entire curriculum, resource document, supplementary materials, or as a laboratory manual of "hands-on" activities which could be infused into existing grades 9-12 curricula. This general teacher's guide provides a rationale for the study of energy education, instructions for using the guide, background information on development of the units, goals/objectives, scope and sequence of the energy education curriculum, summary of the nine units (including unit number and subject area/topic emphasis), unit format, and a matrix indicating how units/lessons can be incorporated into the existing curricula. Strategies for infusing/relating learning to living, school-wide challenges, lifestyle activities, awareness activities, sources of selected references and materials, and a bibliography are also provided. (Author/JN)

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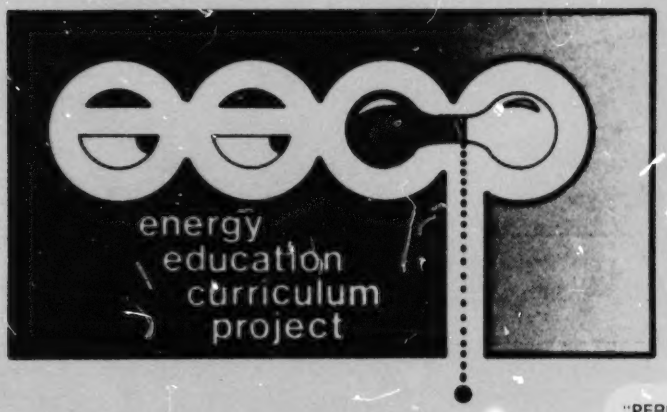
LESSONS from An Energy Curriculum for the Senior High Grades

Teacher Guide

Indiana High School Energy Units



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SE 038 775

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HAROLD H. NEGLEY, STATE SUPERINTENDENT OF PUBLIC INSTRUCTION

ENERGY LESSONS FOR THE SENIOR HIGH GRADES

TEACHER GUIDE

INDIANA HIGH SCHOOL ENERGY UNITS

Division of Energy Policy
Indiana Department of Commerce
Lieutenant Governor John M. Mutz

Division of Curriculum
Indiana Department of Public Instruction
Harold H. Negley, Superintendent
April 1982

FOREWORD

Indiana educators have always responded to the demands placed upon them by society to resolve natural and human resource issues and problems. The task of teaching energy concepts and conservation practices to Indiana's youth is a response to energy problems facing our state and nation. It will be accomplished by many high school teachers and students getting involved in energy education.

We feel that students of all ages must be taught an energy conservation ethic. This ethic will enable each student to use Indiana's and America's energy resources more efficiently and with less waste. To help high school teachers accomplish this major goal, we are pleased to introduce a new Senior High School Energy Education Curriculum. This exciting and innovative program contains energy education activities, programs and resources for you and your students.

We encourage you and your students to get involved in the lessons presented here. We hope you will use these materials as a starting point and go far beyond by involving other classroom teachers, students, resource agencies and citizens in your community. A broad educational effort is needed to help prepare students to deal with this growing issue which affects us all.

Harold H. Negley
State Superintendent of
Public Instruction

John Mutz
Lieutenant Governor
State of Indiana

Energy Conservation: In the Home and On the Farm developed by the Pennsylvania State University, College of Agriculture, Department of Agricultural Education, University Park, Pennsylvania in cooperation with Agricultural Education Section, Bureau of Vocational Education, Department of Education, Harrisburg, Pennsylvania and The Pennsylvania Farm Electrification Council - 1980.

Coal Minicourse, National Science Foundation, Pre-college Teacher Development in Science Program The Geosciences Today, Purdue University, Department of Geosciences, West Lafayette, Indiana, 47907.

George E. Cannon, Patricia Shutt and Joe E. Wright, Energy Education Consultants, and Carol Hahn Wood, Program Developer with the EECP, assumed responsibility for designing this Energy Education Teacher's Guide. They also coordinated the Senior High Review Panel and the Senior High Energy Education Steering Committee.

Members of the Senior High Energy Education Steering Committee are -- John A. Harrold, Director, Division of Curriculum; Darrell Morken, Director, Division of Traffic Safety; Gary Geswein, Agribusiness Education Consultant; Jerry Colglazier, Science Consultant, Joyce Konzelman, Home Economics Consultant; Jane Lowrie, Social Studies Consultant; Victor Smith, Research and Evaluation Coordinator; Gregg Steele, Industrial Education Consultant.

Clarence Broadus and Michael Hennegan, Division of Energy Policy, offered suggestions and comments which helped to improve the materials.

Special recognition is given to Molly Redmond, coordinator, Midwest Energy Education Consortium, for helping to facilitate the Curriculum Exchange Agreement between the Minnesota Department of Education and the Indiana Department of Public Instruction.

This material was prepared with the support of the U.S. Department of Energy (DOE) Grant No. DE-F645-76CS 60038. However, any opinions, findings, conclusions, or recommendations expressed herein are those of the author(s) and do not necessarily reflect the views of DOE.

ACKNOWLEDGEMENTS

The Energy Education Curriculum Project is coordinated by the Indiana Department of Public Instruction, Division of Curriculum, with the support and assistance of the Indiana Department of Commerce, Division of Energy Policy.

These materials, from the senior high grades segment of the Energy Education Curriculum Project (EECP), were adopted from existing national energy education programs. The materials were selected by the EECP staff with assistance and direction from a Review Panel and the Energy Education Steering Committee.

The materials included in the senior high segment of the Energy Education Curriculum Project (EECP) were adopted with permission from the following:

Energy-Environmental Mini-Unit-Guide - A product of the NSTA (National Science Teachers Association) Energy - Environmental Materials Project, John M. Fowler, Director.

The development of these materials was supported by the Office of Environmental Education under the Environmental Education Act of 1970 (P.L. 93-278).

How a Bill Becomes a Law to Conserve Energy, developed by:

National Science Teachers Association under DOE contract #EX-76-C-10-3841. They are available from:

U.S. Department of Energy
Technical Information Center
P.O. Box 62
Oak Ridge, Tennessee 37830

The Minnesota Trial Test Materials
Minnesota Department of Education
625 Capitol Square Building
St. Paul, Minnesota 55101

Developer of Minnesota Program
Mr. Tom Ryerson - Supervisor
Industrial Education

Energy Management Strategies for Colorado Home Economics Teachers, developed by the Colorado State Board of Community Colleges and Occupational Education, by the Public Service Company of Colorado and by Energy and Man's Environment of Portland, Oregon (see logos on following page).

TEACHER GUIDE

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INTRODUCTION
(Rationale)

ENERGY EDUCATION- WHAT IT IS - Past, Present, Future

Energy education is the attempt to resolve the conflict between our present life style and the energy costs in both dollars and resources to produce and maintain that life style.

Energy education is reality education in that it deals with that which exists here and now.

Energy education is also a study of futuristics. The future that all of us must be willing to live in and accept is the one that we are creating right now by our daily decisions. We must examine the beliefs that "growth is good" and "bigger is better" and determine the impact these beliefs will have on our future.

Energy education is a challenge to all classroom teachers. You can meet this challenge, by preparing yourself to answer the following questions:

1. Can you help prepare your students to make wise and careful decisions about our remaining non-renewable energy resources?

2. Can you help prepare them to investigate and make wise decisions about research and development efforts for alternate and renewable resources, recycling programs, more efficient transportation systems, better personal consumption habits, and a personal commitment to efficient energy usage?

3. Can you explain to your classes where energy comes from, basic sources of energy, how long our non-renewable energy resources will last, and the energy options among which our nation's people must choose if we are to survive?

As the three questions above signify, energy education is a challenge which encompasses all facets of living. Energy education is an opportunity for students to have impact on a long-lived problem, an opportunity for teachers to cooperate in interdisciplinary teaching, an opportunity to apply traditional content and skills to an important problem situation, and an opportunity for students to participate in personal and social decisions.

WHY STUDY ENERGY?

"One of the best ways to deal with a crisis is to consider it as an opportunity. From this point of view, the Energy Crisis provides almost endless possibilities for children to learn

about themselves." Energy, after all is what makes all things go. We need to realize that the energy crisis isn't just the newest fad. By studying the energy crisis, students can see where humanity has been, where it is now, and where it might be going. The energy crisis is another chapter in the story of mankind's continuing effort to reshape the world and the inevitable cost of doing that."[1]

To ensure proper utilization of energy sources, our society must be educated to accept alternate life styles, energy resources, technology, consumer behavior and occupations.

The Indiana State Department of Public Instruction, in cooperation with the Division of Energy Policy, Indiana Department of Commerce, has organized the Energy Education Curriculum Project (EECP) to meet the challenge of educating young people (our future adults) about energy resources and the energy crisis.

One of the ways that the Energy Education Curriculum Project will deal with the task of disseminating energy information and education, is through the Indiana Energy Curriculum Units. The units have been organized to help provide educators with lessons, charts, materials and "hands-on" activities to be used in the classroom and community.

[1]Quote taken from: The Science Teacher -- September 1978.
Article: "Teaching the Energy Lesson"
Author: David J. Kuhn

The Teacher Guide:

The purpose of the Teacher Guide in the Indiana Energy Education program for grades (9-12) is three-fold. The first purpose of the Teacher Guide is to provide information.

1. Information

   The Teacher Guide provides information explaining the Energy Education Curriculum Project and the high school energy program. The management, use and evaluation of the curriculum materials are discussed and explained. This explanation includes: Curriculum, designs; Goals/Objectives; How to Make Energy Education Relative; How to Use the Materials and a Matrix Chart. The Matrix Chart is a key component of the program. It shows a listing of all lessons, their objectives and infusion into sixteen (16) subject areas for grades 9-12.

The second purpose of the Teacher Guide is to provide ideas.

2. Ideas

   The Teacher Guide provides the teacher with ideas to incorporate energy education into the classroom and also into the school community. These ideas include Strategies for Infusion, School-Wide Challenges and Awareness Activities.

The third purpose of the Teacher Guide is to provide educators with curricula and energy education resources.

3. Resources

   The Teacher Guide provides valuable resources for the teacher to use for classroom work or simply for easy reference. Special sections entitled "Where to Find Materials" and "Additional and New Sources" provide a substantial amount of resource information about existing energy education materials.

It is hoped that the Teacher Guide will become a stepping stone to the wealth of material presented in the nine units. The units contain hands-on activities, drawings, charts for transparencies or dittos and reference information.

The Curriculum - Background Information:

The Energy Education Units were adopted from existing energy education materials. The EECP staff utilized these existing activities and resources and adapted them for use in Indiana's school communities. A team of Indiana classroom teachers reviewed and evaluated these energy materials and only those

activities or lessons which proved to be most effective were chosen.

The units are designed to be used as the individual teacher wishes. The energy units could be used as the entire curriculum or as a resource document, supplement or laboratory manual of "hands-on" activities which can be infused into already existing curricula.

The Indiana Energy Education material for grades 9-12 consists of a Teacher Guide, nine units containing a wide variety of energy lessons, resources, learning aids and a bibliography.

Goals and Objectives

1. Introduce or reinforce energy concepts/information

   A major goal of the units is to provide senior high educators with the content and resources to teach important energy concepts to students. Hopefully classroom teachers will assume responsibility for preparing students to understand and cope with the transition the world must make from inexpensive and abundant fuels to new forms of, and attitudes about, energy. It is one of the greatest challenges that education will face in our lifetime.

2. Make energy education relevant to the high school student

   An understanding of the energy crisis is a significant prerequisite for teaching students about energy and how it affects their lives. Suggestions for incorporating this awareness and understanding into school-wide activities and curriculum are provided. Also a wide variety of stimulating "hands-on" activities are provided to aid in presenting energy concepts.

   Through the energy education units, energy becomes relevant to the high school student's life. Through this relative and motivational approach students learn by direct experience to manage valuable energy resources.

3. Stewardship

   The first two goals of the senior high curriculum focus on teaching important energy concepts and making this subject relevant to the high school student. To achieve these goals, a third goal is essential. The third goal is stewardship. Human survival depends on proper management of energy, economic, natural and human resources. We must learn to utilize all of our resources more efficiently if we are to survive in an environment fit for life.

Through energy education young adults can learn to make changes and adjustments in their lives to help conserve energy resources. Students who participate in the program will develop stewardship practices. They will share and maintain energy resources with others. Stewardship practices are important in our communities as well as the nations of the world.

In order to achieve the goals of the program the following objectives are provided in lessons.

OBJECTIVES

Participation Habits/Experimentation

1. Students will practice individual and group decision-making roles in their homes, school and community.

2. Students will conduct experiments to gain experience working with instruments involved with measuring energy use, energy production and energy conservation.

3. Students will conduct investigations to acquire knowledge about home energy consumption and conservation.

Information

1. Students will use the concept of outcomes in over-consumption of energy to assess solutions to energy problems in their own everyday environment.

2. Students will explain how energy can be conserved in the home, while purchasing goods, and during production of food and transportation.

3. Students will explain how to assess alternative resources in home construction, home heating/cooling methods, home furnishings, appliance usage, food preparation and transportation.

4. Students will be able to explain that standard units of heat energy, such as Calorie or BTU, can be defined in terms of the energy required to change the temperature of a specified mass (1 kilogram or 1 pound) of a standard substance (water) by a specified number of degrees (1° Celsius or 1° Fahrenheit).

Awareness

1. Students will demonstrate interest in energy conservation, alternative uses and their roles as energy consumers and citizen (group) problem-solvers.

2. Students will demonstrate concern by rating energy and their roles in the energy situation as high priority.

3. Students will recognize alternative energy resources used to produce heat energy for heating homes and offices.

Inquiry Skills

1. Students will estimate relative costs of heat energy from different sources by determining the conversion of the known price per unit of measure to price per unit of heat energy (i.e., price per calorie or BTU).

2. Students will conduct discussions involving clear and significant questions about energy and their roles in the energy problem.

3. Students will articulate their values and apply them to energy situations, specifically in conservation and consumption practices.

4. Students will speculate about alternative futures in energy use and problem-solving.

5. Students will investigate local, state and national litigation involving energy use, energy conservation, energy production and future energy alternatives.

Management

1. Students will practice energy conservation methodology in their everyday living to ensure energy availability for the future.

2. Students will be able to maintain wise energy consumption practices by utilizing alternate energy resources.

3. Students will become involved with proper energy utilization in the home, office or the farm by assessing energy used, energy efficiency and costs to user.

4. Students will play an active role in keeping informed about legislation having to do with energy, maintaining energy resources, and energy conservation.

INDIANA ENERGY EDUCATION CURRICULUM 9-12

SCOPE AND SEQUENCE

The Indiana Energy Education Curriculum Project (EECP) has developed an Energy Education Curriculum for grades 9-12. It consists of nine units and a Teacher Guide with Matrix Chart. These materials include "hands-on" activities, charts, graphs to be used as dittos, references/resources, and the matrix chart with the lessons "keyed" to sixteen subject areas. The Teacher Guide and units are available from the Energy Education Curriculum Project, Room 229, State House, Indianapolis, Indiana, 46204, and were prepared with funds being provided from Department of Energy grant #DE-FG-45-79R 5100 71.

The organization of the curriculum is described below:

Scope and Sequence Chart
Teacher Guide

Information

The Teacher Guide explains the various components of the curriculum and their use. The following sections are included:

- Introduction
- What is Energy Education?
- Curriculum Program and Use
- Goals
- Objectives
- Contents of Program
- Activities Included in Lessons
- Explanation of Extra Materials
- Matrix Chart
- Strategies for Infusion
- Suggested Activities to be used in Energy Education for Grades 9-12
- Evaluation
- References
- Bibliography

Matrix Chart

The units have been arranged and compiled to be used as a reference or manuals for energy education activities. A wide range of disciplines are introduced and can be incorporated into high school subject areas.

Each energy education lesson is "keyed" to sixteen subject areas. These subject areas include: Social Studies, Industrial Education, Agribusiness Education, Home Economics, General Science, Physics, Earth Science, Chemistry, Biology, Mathematics, Language Arts, History, Economics, Government, Driver Education, and Arts and Design.

NOTE: Further explanation of the Matrix Plan follows the Scope and Sequence of the Program.

THE NINE UNITS

The energy education units have been organized by topic and have primary concentration in 2-3 subject areas. They are listed below according to unit number, unit title and primary subject concentration.

Unit Number	Unit Title	Subject Area Topic Emphasis	No. of Lessons
Unit I	Energy Decision Making	Home Economics, Industrial Arts, General Science, Language Arts,	5
Unit II	Energy Use and Conservation in the Home	Economics, Home Economics, General Science, Industrial Arts, Vocational Agriculture	9
Unit III	Energy: Food Production and Preparation	Home Economics, General Science, Economics	4
Unit IV	Energy and Economics	Economics, Mathematics, Social Studies, Industrial Arts, Language Arts	7
Unit V	Energy and Agriculture	Vocational Agriculture, General Science, Biology, Industrial Arts,	1
Unit VI	Fossil Fuels and Energy Alternatives	Biology, General Science, Earth/Space, Physics, Industrial Arts	11
Unit VII	Energy Conversion	General Science, Physics, Mathematics, Chemistry, Arts and Design, Economics	10
Unit VIII	Energy Measurement: Student Activities	Mathematics, Industrial Arts, Physics, General Science, Arts and Design	3
Unit IX	Energy Conservation and the Law	Government, Social Studies, History, Language Arts, Drivers Education	3

Unit Format

Each unit contains many lessons which involve "hands-on" activities for students to do in the classroom. Also resource/reference lists are given in addition to the Bibliography and evaluation forms.

Components of Units	Unit Objective
	Introduction
	Background Information
	Explanation of Lessons
	Resources
	Bibliography
	Teacher Evaulation Form

Energy Education Lessons

The lessons included in each unit contain background or explanatory information needed in order for students to conduct activities in the lessons. In addition to Background Information, Student Activities are provided with resources listed at the end of each lesson. The resources are listed to aid the teacher in acquiring additional information for that particular lesson.

The lessons are denoted by the unit number in addition to a letter. Example: Unit I/Lesson A. Occasionally, there are two lessons which are strongly topic related, therefore they are denoted with the same unit number, same letter and new sub-number. Example: Unit I/Lesson A1 and Unit I/Lesson A2.

Lesson Format

Components of Units	Lesson Title
	Lesson Objective
	Background Information
	Activities
	Resources

MATRIX PLAN
FOR
ENERGY EDUCATION LESSONS

Explanation:

The matrix plan for the energy education lessons is to be used by the instructor to select particular units and lessons that can be infused into existing curricula. In order to fulfill this task the following information is provided in the Matrix Plan:

Units

Each of the nine (9) units is denoted with a Roman Numeral in addition to the title. The main objective of each unit is given to aid the teacher by singling out the primary focus of that section in the curriculum. The units are then divided into lessons which contain reference materials, student activities, resources, and background information. *(Refer to Scope and Sequence Chart for unit and lesson components.) Each unit contains anywhere from 1-8 lessons.

Lessons

The lessons are denoted with a capitol letter and title. Following the lesson title, the lesson objective is provided, and the lessons are "keyed-in" to sixteen disciplines.

Disciplines

The matrix chart has been designed to aid the teacher in selecting lessons which can be infused into existing curriculum. The selection can be made with the use of the following key:

P=Lessons with a Primary concentration in a particular discipline.
M=Lessons with a Minor concentration in a particular discipline.
R=Lessons which serve as a resource.

By using the letter system, P-M-R, the teacher will be able to quickly select a lesson which meets the needs of the students and blends in with existing curriculum. A few lessons contain primary and secondary concentrations and serve as a resource. These are listed with the letters P-M-R under them. The high school curriculum contains a variety of lessons keyed to various disciplines to allow a teacher a wide choice of topics, activities and resources.

UNIT		LESSONS		DISCIPLINES GRADES 9-12															
Number & Title	Objective	Letter & Title	Objective	Science	Physics	Earth/Space	Chemistry	Biology	Mathematics	Social Studies	Economics	Government	History	Language Arts	Vocational Ag	Industrial Arts	Arts & Design	Home Economics	Drivers Ed
Unit I, Energy Decision Making (Housing and Home Furnishings)	The student will demonstrate wise decision making in: 1) energy consumption practices; 2) selecting types of energy to use; and 3) storage or retention of energy in the home.	Lesson A "Water Heaters and Water Usage"	Students will: 1) relate the role of a water heater to home water and energy conservation; and 2) propose a plan of water and energy conservation for their own homes.	P	P				M	M	P	P M		M		P	M R	P	
I	" "	Lesson B "Home Lighting Plan Which Conserves Energy"	Students will design a home lighting plan that is both useful and conserves energy.	P	M		M		M		P M			M			P	P	
I	" "	Lesson C "Appliance Energy Use"	Students will point out various ways to conserve energy when using appliances and calculate how much energy appliances use.	P	P				P M			P M		M			M	P	

UNIT		LESSONS		DISCIPLINES GRADES 9-12																
Number & Title	Objective	Letter & Title	Objective	Science	Physics	Earth/Space	Chemistry	Biology	Mathematics	Social Studies	Economics	Government	History	Language Arts	Vocational Ag	Industrial Arts	Arts & Design	Home Economics	Drivers Ed
I	Upon completion of this unit, the student will demonstrate wise decision making in energy consumption, what type of energy used, how much energy is used and the storage of that energy in the home.	Lesson D "Caulking and Weather-stripping"	Students will define caulking and weather-stripping and demonstrate the application of each.	R	M		R		M						P	P		P	
I	" "	Lesson E "Windows and Energy"	Students will determine that a great amount of the heat loss is through the windows of a home, and identify types of windows that are most efficient.	P	P				M		M			M		P	P	P	
Unit II Energy Consumption in The Home	Upon completion of this unit, the student will be able to assess his/her home for energy efficiency.	Lesson A "Energy Conservation In The Home"	Students will know how to correct heat/energy loss due to waste, and be aware that energy used unwisely or wastefully is very expensive.	M	M	M			M	M	M	M			P	P		P	

UNIT		LESSONS		DISCIPLINES GRADES 9-12																
Number & Title	Objective	Letter & Title	Objective	Science	Physics	Earth/Space	Chemistry	Biology	Mathematics	Social Studies	Economics	Government	History	Language Arts	Vocational Ag	Industrial Arts	Arts & Design	Home Economics	Drivers Ed
II	Upon completion of this unit, the student will be able to assess his/her home for energy efficiency.	Lesson B "Supplemental Information, Using Wood"	Students will demonstrate the installation, maintenance and use of the wood stove in the home and become knowledgeable about the costs involved, safety practices and proper wood selection.	P	P	P R		M	M	P M	M	M			P M	M	P R	P	
II	" "	Lesson C "Supplemental Information, R-Values and Uses"	Students will associate the R-value with insulation type and be aware of available insulation materials, their uses and costs.	M	M	P	M		P		P	R			M R	R		M	
II	" "	Lesson D "Home Heating and Cooling--Save Energy, Save Dollars"	Students will be able to determine how heating waste in our homes can be eliminated and energy conserved.	M	M	P M		M	P M		P M				P			M	
II	" "	Lesson E "Energy Questions and Checklists"	Students will answer questions about home construction, lighting in homes and business and residential energy use.	M	M	M			R			P M		P	P R	M	R	M	

UNIT		LESSONS		DISCIPLINES GRADES 9-12															
Number & Title	Objective	Letter & Title	Objective	Science	Physics	Earth/Space	Chemistry	Biology	Mathematics	Social Studies	Economics	Government	History	Language Arts	Vocational Ag	Industrial Arts	Arts & Design	Home Economics	Drivers Ed
II	Upon completion of this unit, the student will be able to assess his/her home for energy efficiency.	Lesson F "Weatherize Your Home"	Students will determine methods to reduce heating and cooling costs by demonstrating weatherstripping of of doors and windows and sealing exterior openings.	R M	M				M		P M				P	M	P	P M	
II	" "	Lesson G "An Easy-On-Energy-Home"	Students will compare their own homes with "Easy-On-Energy" home.	P M	M				R	M	M	P M		M	P	P	R	M	
II	" "	Lesson H "Making an Insulation Experiment Model"	Students will be able to construct an insulation experiment model and demonstrate its use.	P	P		P M		M		M R			M	M R	P	P M	M	
II	" "	Lesson I "Energy Conservation Worksheets"	Students will be able to answer questions concerning the most energy efficient home by viewing drawings of various construction techniques.	P	M R				M R					P M	P	M	P	P	

UNIT		LESSONS		DISCIPLINES GRADES 9-12																
Number & Title	Objective	Letter & Title	Objective	Science	Physics	Earth/Space	Chemistry	Biology	Mathematics	Social Studies	Economics	Government	History	Language Arts	Vocational Ag	Industrial Arts	Arts & Design	Home Economics	Drivers Ed
Unit III Energy: Food Production and Preparation (Energy Use and Conservation)	Students will gain an increased awareness of energy conservation, and be able to make wise decisions concerning energy use, alternative resources, future home types and occupations.	Lesson A "Energy Use and Energy Conservation In The Home" (Home Energy Game)	Students will identify and select energy conservation practices in the home.	M			M	M		M		M R			M	P M		P	
III	" "	Lesson B "Energy Consumption in Food Production and Preparation"	Students will be able to give examples of sources of energy, expenditures for food production and processing.	M	M		M	R M	P		M	M		M	M R			P	
III	" "	Lesson C "Food Preparation and Energy Conservation Techniques"	Students will be able to use and maintain cooking appliances and practice food preparation techniques which conserve energy.	M	M			R			M							P	

UNIT		LESSONS		DISCIPLINES GRADES 9-12																
Number & Title	Objective	Letter & Title	Objective	Science	Physics	Earth/Space	Chemistry	Biology	Mathematics	Social Studies	Economics	Government	History	Language Arts	Vocational Ag	Industrial Arts	Arts & Design	Home Economics	Drivers Ed
III	Students will gain an increased awareness of energy conservation, and be able to make wise decisions concerning energy use, alternative resources, future home types and occupations.	Lesson D "Oven Use and Energy Consumption"	Students will be able to demonstrate the energy consumption differences of conventional and microwave ovens.	P	P		M		M		P	M		M				P	
Unit IV Energy and Economics (Residential and Agricultural)	Students will understand: 1) costs of maintaining a specified standard of living and that; 2) energy usage can be controlled with wise choices and decisions about future lifestyles. Students will be able to analyze the importance of managing time, energy and economic and environmental resources.	Lesson A "Community Involvement in Government Rationing, Pollution-A Role Playing Lesson"	Students will: 1) study transportation and energy systems; and 2) make recommendations to a mock town council on how to manage the system more effectively.	M		M			P M		P	P		P M	P			P	P

UNIT		LESSONS		DISCIPLINES GRADES 9-12																
Number & Title	Objective	Letter & Title	Objective	Science	Physics	Earth/Space	Chemistry	Biology	Mathematics	Social Studies	Economics	Government	History	Language Arts	Vocational Ag	Industrial Arts	Arts & Design	Home Economics	Drivers Ed
IV	Students will be aware that the costs of maintaining a particular standard of living and the energy used, can be controlled with wise choices and major decisions about lifestyle. The student therefore analyzes the importance of managing time, energy and economic and environmental resources.	Lesson B "Wise Use of Decreasing Natural Resources"	Students will be able to read utility meters and to apply the methods used in meter. reading to actual energy consumption in household appliances.	R M	M	M			P M	R	P M	R		M	P	P		P	
IV	" "	Lesson C "Standard of Living"	Students will illustrate the relationship between standard of living and energy use in a values clarification exercise.	R M				R		P	P	M	P M	P				P	
IV	" "	Lesson D "The Need For Energy Conservation in the Home and on the Farm"	Students will be able to discuss and justify the need for energy conservation using information about current energy supplies, technology, and energy sources.	P M	M	P M	R	R	M	M	P	M R		M	P	M R		P	

UNIT		LESSONS		DISCIPLINES GRADES 9-12																
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Unit IV	Students will be aware that the costs of maintaining a particular standard of living and the energy used can be controlled with wise choices and major decisions about lifestyle. The student therefore analyzes the importance of managing time, energy and economic and environmental resources.	Lesson E "The Need For Energy Conservation, Student Information Sheets"	Students will be able to discuss the use of alternative energy sources and the advantages and disadvantages of each.	P M R	R	P M	M	M		M	M	R	M	M	P	M		M	P
IV	" "	Lesson F "Resources and their Wastes - Air, Water and Soil Pollution"	Students will be able to discuss the possible environmental consequences of the various alternative energy sources.	P	M	P	M	P			M	P M	R	M	P M	M		M R	
IV	" "	Lesson G "Fuel Consumption Checklist and E.Q. Lesson"	Students will be able to demonstrate knowledge and understanding of energy - environmental issues.	P M	M	M				P M		P M	M	P	M	M		P M	M

UNIT		LESSONS		DISCIPLINES GRADES 9-12																	
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Unit V Energy and Agriculture	Students will become more knowledgeable about farm management, buildings and energy use.	Lesson A "Energy Conservation on the Farm"	Students will be able to name and demonstrate conservation measures that relate to livestock, growing crops and housing.	P	M	P	P	P	M		P M	M		M	P M R	P	M	M R	M

UNIT		LESSONS		DISCIPLINES GRADES 9-12																
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Unit VI Fossil Fuels and Energy Alternatives (Solar, Coal)	3 main objectives: Upon completion of this Unit, the student will develop an understanding of how the sun and coal can be utilized as energy efficient resources. The student will be able to explain problems and assets associated with solar collectors and the burning of coal and recommend solutions to the problems. The student will support and practice wise utilization of coal resources and support expenditures for research and development of efficient surface mining operations, reclamation practices and solar operations and methods.	Lesson A "All Buildings are Solar Collectors"	Lessons A-H (Solar Lessons) Students will determine the effect of shading a south window with an overhang on the temperature inside a room by constructing a model and taking measurements.	P M	P M	M	R		P M R		R			M	M	P M R	P M R	M	

UNIT		LESSONS		DISCIPLINES GRADES 9-12															
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Unit VI	Same as Lesson A	Lesson B "The Cardboard Carpenter and The Solar Hot Plate"	Students will build a workable flat plate solar collector at virtually no cost.	P M	P M	P M R	R	M	P M R		M				M R	P M R	P M R	M	
VI	Same as Lesson A	Lesson C "A Green/Ice House"	Students will use the "greenhouse effect" to make a greenhouse for growing vegetables, or a light, portable ice-fishing shelter out of salvaged and inexpensive materials.	P	M	P M	R	P M	P M R		R				P M R	P M R	P M R	M	
VI	Same as Lesson A	Lesson D "A Wet Solar Collector"	Students will build an active solar collector by using the air conditioner condenser and the heater/blower assembly from a wrecked car.	P	M	R	M R	R	R		R				M R	P M R	P M R	M	P M R

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Unit VI	Same as Lesson A	Lesson E "The Sunshine Papers"	Students will design a flat plate solar collector. The finished product will be the drawing, which will include all dimensions, notes, list of materials and other pertinent data.	P	P M	P M R	R		P M R		R			P M R	M	P M R	P M R	M	
VI	Same as Lesson A	Lesson F "Color Conduction Comparison"	Students will determine heat conduction characteristics of various colors and identify and use simple methods of measuring temperature differentials.	P	P	P	P M R	M	P M R					M	R	P M R	P	M R	
VI	Same as Lesson A	Lesson G "Wind Generator"	Students will construct the wind generator described and study some measurable variables associated with the production of electricity from wind.	P M R	P M				P M R					M	P M R	P M R	P M R	R	

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Unit VI	Same as Lesson A	Lesson H "Second Hand Solar Sources, Savonius Rotors"	Students will construct a vertical axis wind generator, a Savonius Rotor, from easily obtainable materials.	P M R	P M				R						M	P M R	M R	R	
VI	Same as Lesson A	Lesson I "Coal and Energy"	Lessons I-K (Coal Lessons) Students will develop an understanding of how coal is made and be able to list uses of coal.	P	M	M	P	P		R					M	R		R	
VI	Same as Lesson A	Lesson J "Types of Mining and Mines"	The student will develop an understanding of various types of mining methods used.	P	M	M	R	M		R		M			R	R		R	
VI	Same as Lesson A	Lesson K "Problems with Coal and Solutions"	Students will explain problems associated with coal mining and the burning of coal and recommend solutions.	P M	M	M	R	M		R		M		M	R	R		R	

UNIT		LESSONS		DISCIPLINES GRADES 9-12															
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Unit VII Energy Conversion	Students will be able to define the common units for measuring heat energy (Calorie, BTU) and convert measurements from one to another, given the conversion formulas. Students will be able to calculate the heat transferred to water by different heat sources, given its mass and change in temperature.	Lesson A "Calories for Heating Our Homes-The Cost of Heating"	Students will become familiar with the common units for measuring heat energy (Calorie, BTU) and be able to calculate the heat transferred and the cost per unit.	P M	M	P M			P		M P R	M			R	R	P M R		
VII	" "	Lesson B "Do We Know the Heat Produced Per Unit of Measure?"	Students will compare the relative cost of different energy sources using their costs per unit of heat energy and identify the most economical one.	M	P		P M		P		P M								

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Unit VII	Students will be able to define the common units for measuring heat energy (Calorie, BTU) and convert measurements from one to another, given the conversion formulas. Also, students will be able to calculate the heat transferred to water by different heat sources, given its mass and change in temperature.	Lesson C "Measuring Heat Transfer: The Calorie"	Students will be able to determine that the change in temperature depends also on the mass of the substance being heated by conducting a series of experiments.	P	M	M	P M		P		M				R	R			
VII	" "	Lesson D "Kilowatt-hours, Calories and BTU's"	Students will determine the number of calories that are equivalent to one kilowatt-hour, and also become familiar with the BTU and compare it to the calorie and kilowatt-hour.	P	M		P M		P										

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Unit VII	Students will be able to define the common units for measuring heat energy (Calorie, BTU) and convert measurements from one to another, given the conversion formulas. Also, students will be able to calculate the heat transferred to water by different heat sources, given its mass and change in temperature.	Lesson E "The Most Economical Home Heat Source"	Students will determine the most economical heat source from the information they have obtained in previous lessons.	P	M				P	M	P	R			R	R	K	P M	
VII	" "	Lesson F "Construction of a Hydro-electric Generator"	Students will learn how to construct a simple hydroelectric power generating system.	M	M	M R			R				M	P	M	P	P		
VII	" "	Lesson G "Heat Exchangers"	Students will build a simple liquid to air heat exchanger, in order to see how the process of heat exchange takes place.	P	P	P	P	M	M					M	M R	P		R	

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Unit VII	Students will be able to define the common units for measuring heat energy (Calorie, BTU) and convert measurements from one to another, given the conversion formulas. Also, students will be able to calculate the heat transferred to water by different heat sources, given its mass and change in temperature.	Lesson H "Moonshine Travel: Sunshine Solutions"	Students will be able to run a dynamometer test, plot the horsepower and torque characteristics for 3 different fuels, and compare the exhaust characteristics of 3 different fuels.	M	P M		M	M	P M R						P M R	P M			P M
VII	" "	Lesson I "Seeing Dust As A Fuel"	Students will study the concept of recycling by constructing a useful product.	M			M	M							M	P M R	M	P M	
VII	" "	Lesson J "Pedal Power"	Students will construct a machine that will enable a person to generate electricity by pedaling a bicycle.	M	P M				M					R	R	P R	P		M

UNIT		LESSONS		DISCIPLINES GRADES 9-12															
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Unit VIII Energy Measurement: Student Activities	Students will become familiar with the operation of the thermostat and the IC centigrade thermometer and their constructions. Students will be able to design an energy efficient home and conduct home insulation audits.	Lesson A "The Bimetallic Robot"	Students will design, construct and test their own thermostats as well as use the principle of a thermostat to make a temperature change indicator.	P M R	M		R		M					M	M	P	P	R	
VIII	" "	Lesson B "Make Room(s) for Energy"	Students will design a home which combines energy conservation and energy conscious concepts.	P R	M	P R			M R	M R	P R		M R		P R	P R	P R	P R	
VIII	" "	Lesson C "A Do-It-Yourself Home Insulation Test"	Students will be able to: 1) take temperature measurements to determine whether or not walls in their home require added insulation; 2) conduct home insulation audits.	P R					M R		M R				P R	P R		P R	

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Unit IX Energy Conservation and the Law	Students will become familiar with the legislative aspect of energy and what is being done in this country to help combat the energy crisis.	Lesson A "How a Bill Becomes A Law"	Students will be able to: 1) identify the major factors that influence the passage and/or modifications of legislation; 2) demonstrate an understanding of the lawmaking process; 3) evaluate a law as an example of good law.							P		P	M R	P					P
IX	" "	Lesson B "Does The 55 MPH Speed Limit Save Lives?"	Students will be able to develop increasing competency in gathering data and testing a hypothesis.	M						P		P		P					P

STRATEGIES FOR INFUSION/RELATE LEARNING TO LIVING

The Energy Education Curriculum Project staff recognizes that various aspects of energy education fit well into existing disciplines.

Although most of the lessons and suggestions in this Curriculum encourage teachers to incorporate energy into the existing curriculum, some suggestions may stimulate multidisciplinary activities. New emphasis on energy as a basic consideration for every aspect of life puts a new perspective on human knowledge to show a "connectedness" that was not obvious before. Energy choices are not only technological ones; they are likely to have effects on personal and international economics, the environment and its capacity to safely sustain us, the materials our students will use, and the lifestyle options that future generations may have. One discipline in the curriculum cannot adequately prepare our youth to deal with these problems and issues.

A variety of approaches are recommended for teaching about energy. The lessons and activities included in this introductory guide are just a few examples of ways to develop:

1. Energy awareness,
2. Understanding of energy systems,
3. Problems and issues, and
4. Recognition of the roles individuals must play in order to assume that this and future generations will be able to survive.

One of the major roles of teachers in energy education is to integrate energy ideas and concepts with standard courses. Unless energy can be seen as part of the general learning process, students may get the idea that energy is a separate and distinct entity, when it is actually just the opposite. Energy provides the foundation for understanding our society, our social and personal decisions, and our relationship to other nations and cultures. One challenge for teachers is to find a "good match" between subject, topics and energy concepts so that energy can be incorporated into traditional areas of study, thereby enriching those courses.

To provide an awareness of opportunities for the incorporation of energy concepts, lists of subject area topics and energy concepts should be developed. This approach is an example of one way to integrate energy with on-going course work. Examples of Science and Industrial Education are given on the following page. Other approaches include:

1. Matching subject area skills with skills needed to investigate energy problems.

2. Identifying areas of student interests in energy and matching those to subject area topics.

3. Identifying community concerns about energy and matching those to subject area topics.

By using a list of energy concepts and the lists of topic areas taught in various disciplines it should be easy to identify "good matches" for future integration activities.

Samples:

Science

(General and Physical)

Matter
Atoms
Energy
Chemical changes
Heat & temperatures
Forces & motion
Waves & sound
Height
Electricity & magnetism
Energy for everyday use
Sources of energy
Changes in the rocks
Changes through time
Changes in the atmosphere
Our changing frontiers
Life on earth
Community relationships
Continuing the species
The human organism
The quality of our environment

Industrial Arts

Construction
Manufacturing
New materials
Processed materials
Processes
Products
Tools
- identification
- selection
- maintenance
- proper use & functions

By-products
Safety
Careers
Design
Transportation
Research & development
Industrial impact on society
Communications
Environmental impacts
Cultural impacts
Changing technology

SCHOOL-WIDE CHALLENGES

One important aspect of energy education for high school students involves their active participation in school-wide activities. School projects, undertaken in conjunction with classroom studies of energy, are particularly effective in raising the awareness of teens about energy and in fostering their participation in energy decision making.

Working together on a school-wide project gets teens involved in energy issues. This direct involvement can lead to student commitment and enthusiasm which sets the tone for the whole school. Active participation in meaningful projects can create an atmosphere of energy awareness. Students, working together on energy activities, can achieve a feeling of success, commitment, and participation that can enhance classroom learning.

Several initial suggestions are provided here to get students started. They will be able to add many more to the list if given a chance to "brainstorm" ideas that may be particularly applicable to the local community. The first suggestions are lifestyle activities--those activities which involve group participation for a period of time. These suggestions are followed by awareness activities which can provide information about energy and energy conservation. These activities can be initiated by student groups such as the student council, Honor Society or Science Club. Furthermore, energy could be a year-long theme for all clubs. Students will need direction and encouragement.

Extra Activities

LIFESTYLE ACTIVITIES

Bus Transportation. - A student group could suggest possibilities for increased use of the school bus service. After interviews, they could suggest ways to increase the number of students riding the bus. This might include a demonstration of fuel or money saved, an award system, or special privileges for bus riders.

Car Pooling System. - Students could develop a centralized system for ride sharing among students. This could include a service to match those going in the same direction. A bulletin board system or central card file could be maintained by students to encourage car-pooling.

Biking. - Students could encourage bike riding as the "in" thing to do by organizing bike riding groups to and from school. They could also encourage the installation of bike racks.

Students could also design an acceptable bike route(s) plan for their school and present it to their school administrator for support. They could also present the plan to local city officials for support - ask the school and city to help construct signs, solicit support from students and implement their plan. The plan should consider safety, traffic movement, attractive signs, etc. Be sure to contact administration, school board, etc... with help from local traffic department before starting activity.

Cafeteria. - After research, students could offer suggestions to cafeteria personnel about energy savings in meal preparation. Student participation in menu selection and food service could result in energy savings and food savings. Research should be thorough and complete before conducting this activity.

Recycling. - A year-long recycling effort could result in a change of habits about the disposal of clothes, toys, papers, bottles, and cans. Students could initiate, publicize and monitor central collection points within the school.

Vending Machines. - After a thoughtful awareness campaign, students could suggest the use of recyclable materials in vending machines, whenever possible.

Dress Ecologically. - Students can distribute information about the insulation factor of various types of clothing. Dressing ecologically could be encouraged by an energy fashion show or by posters.

Award System. - Students, working with teachers and administrators, could devise an energy incentive system and recognize outstanding efforts in energy conservation. Many awards already exist, through the Department of Commerce and the Energy Education Curriculum Project.

Note: Energy audits are now being conducted state wide by governmental officials. Contact: School Disaster and Energy Planning (317) 927-0336.

Energy Audit. - This year-long effort involves documenting weekly school energy use and posting results on school bulletin boards or in the cafeteria or library. Energy Watchers could also caulk windows, conduct heat loss studies, and make recommendations to administrators and school boards.

School Power Consumption. - A student group could determine the consumption of power for their school and home(s) during different months and seasons of the year and project, based on student research, the most efficient time of the year to conduct classes. Students could make presentations to the school board and make recommendations based on their findings.

AWARENESS ACTIVITIES

Energy Book Month

Designate an "Energy Book Month" and have a media specialist or librarian arrange a special display of books, pamphlets, magazines, filmstrips, etc., about energy. Students could work with librarian and faculty and make suggestions for updating energy collection.

Energy Film Fair

An Energy Film Fair could be held using free or inexpensive films available from utilities, libraries, the Department of Energy or universities. This could be held in conjunction with the noon hour and/or in the evening for adults. A film, festival could be planned for the community over a year long period.

Contact the Audio Visual Branch, Office of Public Affairs, Department of Energy, Washington, D.C. 20545, Telephone: 301/353-3596 for Energy Films Catalog. Films are available as free loan for schools.

Energy Speakers Bureau

Students could form an Energy Speakers Bureau by contacting local speakers from business. For example, contact utilities for services they may offer such as speakers, facility tours, informational brochures and films. This list could then be publicized and made available to teachers and community groups.

Energy Essay Contest

Sponsor a school wide essay contest using such topics as: "Energy Usage Then and Now," "Insulation and Energy," "Diary of an Energy Conserver," "Energy Interdependence," or "Energy and My Lifestyle." Many public utilities, governmental agencies or local community groups could be contacted to help sponsor such a program. Getting the community involved will greatly enhance the program.

Energy Watchers Club

Organize an Energy Watchers Club to keep track of energy usage in a school buidling with the help of the custodian. Post graphs or charts in the school lobby or cafeteria.

Energy News and Hints

Devote a section of each issue of the school newspaper to articles about energy and hints to save energy. Sponsor an energy conservation slogan contest in the paper. Interview students, parents and community members to obtain a broad perspective of how energy affects us all. Promote activities in the paper also.

Energy Minutes

Just as TV's "Bicentennial Minutes" became an enlightening and enjoyable part of our Bicentennial celebration, "Energy Minutes" can serve a similar function. Organize a contest in which young people are invited to submit unusual or interesting energy facts. Then reward the most original and thought provoking entries by reading their "Energy Minutes" as part of the school announcements during the year.

An alternative to the school announcements would be to arrange for a local radio or television station to broadcast the minutes as a public service to the community. In this way, the energy message reaches far beyond the school environment.

Energy Information Center

Have young people set up an energy information center in school media center or lunchroom. The center can provide information about sources and uses of energy, energy conservation efforts, research about new sources, laws, etc. Students can also share the results of their own energy experiences.

Energy Fair

Sponsor an Energy Fair or an Energy Awareness Day and invite parents and community members. Other groups who have sponsored energy events such as this have included information; games; student displays; and commercial, utility and state agency displays. Other activities that have been held in conjunction with energy awareness days include biking to school, carpools, energyless lunches, recycling drives, and poster contests.

Poster Contest

Conduct a teacher or adult poster or collage contest using young people as judges. Some possible themes may be "Energy in the Future," "Energy Watchers," "Energy Savers," "Energy in the Good Old Days," "Energy and Your Lifestyle," or "Energy and Recycling;" or, have a student poster contest for different grade levels throughout the year.

Tips for Energy

Have students produce a "Tips for Energy" booklet to suggest ways to save energy in the home, school, car, stores, and the community. Distribute the booklet to interested citizens.

Energy Debate

Organize an energy debate where the economic, safety, political, environmental, and social advantages and disadvantages of a particular energy source are discussed. Audience could physically move from side to side to indicate their agreement or disagreement with the points raised.

Energy Time Line or Wall Mural

Have students make a time line or wall mural on the sources of energy used by man in historical sequence. Include nuclear, water power, oil, wind, wood, coal, natural gas, solar, tidal, chemical, solid waste, etc. Other themes for wall murals include local energy issues, how students use energy as they grow older, energy futures, or energy lifestyles.

Energy Presentation to School

Design a half-time program with the school band to encourage energy conservation.

Energy Exhibit

Develop a display, exhibit or demonstration about energy for use in community buildings such as schools, city hall, library, or shopping mall.

Energy Film

Make a film or slide tape showing the need for studying energy and activities undertaken at the school.

Energy Quiz

Organize an on-going energy quiz game between teachers and students during noon hours.

Energy Mottos, Themes

Develop school mottos, themes, animated mascots, etc., to demonstrate energy awareness.

WHERE TO FIND MATERIALS

SELECTED REFERENCES

Background Information

The Division of Curriculum energy education staff did a national search during the early part of 1980 to locate already existing energy education materials. After the search was initiated it became apparent that a variety of energy education materials did exist in certain subject areas.

At approximately the same, a Senior High School Energy Education Steering Committee was organized by the Division of Curriculum to help provide direction to the Energy Education Curriculum Project. After previewing existing energy education materials, the Committee and the Energy Education Curriculum Project (EECP) staff decided to adopt/adapt existing energy education materials.

The Committee and the EECP staff also agreed that a Materials Evaluation Form should be designed. The form could be used by classroom teachers and school administrators to evaluate new and existing energy education materials.

A newly organized Senior High School Review Panel met at Marian College in Indianapolis on April 19, 1980, to evaluate existing energy materials available from public agencies. Classroom teachers, representing all five subject areas, used the EECP evaluation form to help select the best materials for each curriculum area.

Next, the EECP staff compiled this data and was able to rank the best materials in each area. The criteria used to select the best materials was: Those materials with the highest scores for all questions will be ranked the best.

Those materials which were ranked the top five are included in this reference list in the order of their selection. Hopefully, they will be of continued use as you incorporate energy in the five curriculum areas.

VOCATIONAL AGRICULTURE

Conservation - in the Home - on the Farm

The Pennsylvania State University
Department of Agricultural Education
102 Arnesky Building
University Park, PA 16802

Price: Teacher's Guide $5.50
Students" Guide $3.35

Energy Conservation Activities for the Classroom

Kentucky Department of Education
1829 Capital Plaza Tower
Frankfort, KY 40601

A Guide to Energy Savings - for the Field Crops Producer

A Guide to Energy Savings - for the Dairy Farmer

A Guide to Energy Savings - for the Poultry Farmer

These materials available from:

Office of Communications
Publications Division
U.S. Department of Agriculture
Washington, D.C. 20205

Price: Free

INDUSTRIAL ARTS

Minnesota Trial Test Materials

Minnesota Department of Education
624 Capitol Sqaure Building
St. Paul, MN 55101

Energy Conservation in Construction Trades

The National Center for Research in
Vocational Education
The Ohio State University
1960 Kenny Road
Columbus, Ohio 43210

Energy Conservation for the Illinois Home

Institute of Natural Resources
222 South College Street
Springfield, IL 62706

Solar Power

Project CREATION
LaSalle - Peru Township High School
541 Chartres Street
LaSalle, IL 61301

Price: $2.25

Energy, Engines and the Industrial Revolution

U.S. Department of Energy
Technical Information Center
P.O. Box 62
Oak Ridge, TN 37830

Price: Free

SCIENCE

Energy, Food and You

Washington State Department of Education
Office of Environmental Education
Old Capitol Building
Olympia, WA 98504

Price: $5.00

Energy, Engines and the Industrial Revolution

U.S. Department of Energy
Technical Information Center
P.O. Box 62
Oak Ridge, TN 37830

Price: Free

Solar Energy (General Topics)

Price: $2.50

Solar Energy (Chemistry and Physics)

Price: $2.20

Solar Energy (Junior High School)

Price: $2.75

Solar materials were developed by the

U.S. Department of Energy

They are available from:

U.S. Government Printing Office
Washington, D.C. 20402

HOME ECONOMICS

Energy Management Strategies for Colorado Home Economics Teachers

State Board of Community Colleges and
Occupational Educationa
Centennial Building
2nd Floor
1313 Sherman Street
Denver, CO 80203

Price: $8.00

Minnesota Trial Test Materials

Minnesota Department of Education
624 Capitol Square Building
St. Paul, MN 55101

Energy Food and You

Washington State Department of Education
Old Capitol Building
Olympia, WA 98504

Price: $5.00

Energy Conservation Activities for the Classroom

Kentucky Department of Education
1829 Capital Plaza Tower
Frankfort, KY 40601

Energy Conservation Resource Guide -
Environmental Education for Grades 7-12

Idaho Office of Energy
State House
Boise, Idaho 83720

Price: Free

SOCIAL STUDIES

Energy Policy as a Political Issue

How a Bill Becomes a Law to Conserve Energy

Energy in the Global Marketplace

All the Social Studies materials listed

above will be used in the Indiana curriculum.

They are available from:

U.S. Department of Energy
Technical Information Center
P.O. Box 62
Oak Ridge, TN 37830

Price: Free

Ideas and Activities for Teaching Energy Conservation
Grades 7-12

The University of Tennessee
Environment Center
South Stadium Hall
Knoxville, TN 37916

Price: Free

Consuming Energy: The U.S. vs the World

Project QUEST
855 Broadway
Boulder, CO 80302

Solar Energy (General Topics)

Price: $2.50

Solar Energy (Chemistry and Physics)

Price: $2.20

Solar Energy (Junior High School)

Price: $2.75

Solar materials were developed by the

U.S. Department of Energy

They are available from:

U.S. Government Printing Office
Washington, D.C. 20402

HOME ECONOMICS

Energy Management Strategies for Colorado Home Economics Teachers

State Board of Community Colleges and
Occupational Educationa
Centennial Building
2nd Floor
1313 Sherman Street
Denver, CO 80203

Price: $8.00

Minnesota Trial Test Materials

Minnesota Department of Education
624 Capitol Square Building
St. Paul, MN 55101

Energy Food and You

Washington State Department of Education
Old Capitol Building
Olympia, WA 98504

Price: $5.00

Energy Conservation Activities for the Classroom

Kentucky Department of Education
1829 Capital Plaza Tower
Frankfort, KY 40601

Energy Conservation Resource Guide -
Environmental Education for Grades 7-12

Idaho Office of Energy
State House
Boise, Idaho 83720

Price: Free

SOCIAL STUDIES

Energy Policy as a Political Issue

How a Bill Becomes a Law to Conserve Energy

Energy in the Global Marketplace

All the Social Studies materials listed

above will be used in the Indiana curriculum.

They are available from:

U.S. Department of Energy
Technical Information Center
P.O. Box 62
Oak Ridge, TN 37830

Price: Free

Ideas and Activities for Teaching Energy Conservation
Grades 7-12

The University of Tennessee
Environment Center
South Stadium Hall
Knoxville, TN 37916

Price: Free

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Additional and New Sources

DOE PROVIDES DRIVING TIPS

A small leaflet, How to Save Gasoline and Money, DOE/OPA - 0040 (5-79 is available from the U.S. Department of Energy Office of Public Affairs, Washington, D.C. 20585. This leaflet offers suggestions on how to drive more efficiently, how to plan your trips, how to care for your car, and how to choose your next car.

DOE PROVIDES TIPS FOR SAVING ENERGY

An excellent source of suggestions for saving energy around the home is the 46 page booklet, Tips for Energy Savers. Published by the Department of Energy, DOE/CS - 0020, March, 1978, the booklet is available (single copies) from "Tips for Energy Savers," Pueblo, Colorado 81009, and bulk copies from the U.S. Department of Energy, "Tips" Distribution, Office of Administration Services, Washington, DC 20545.

CONTACTS FOR NEW SOURCES

For information on ways to save energy and apply new energy sources, you may wish to contact one or more of the following places:

SOLAR ENERGY

Hotline: 800-523-2929

General Information:
National Solar Heating and Cooling Information Center
P.O. Box 1607
Rockville, MD 20850

Solar Energy Sourcebook (listing, products, consumers, etc.):

Solar Energy Institute of America
110 Sixth Street, NW
Washington, DC 20001

Blueprints for USDA attic collector solar home:

Agricultural Engineer
Extension Service
USDA
Washington, DC 20250

WIND ENERGY

American Wind Energy Association
1621 Connecticut Avenue, NW
Washington, DC 20009 (202-667-9137)

WOOD ENERGY

Wood Energy Institute
P.O. Box 800
Camden, ME 04843 (202-636-4841)

WEATHERIZATION

Comprehensive Energy Conservation Manual
Office of Energy Programs
Riley-Robb Hall
Cornell University
Ithaca, NY 14853 (price: $1.00)

HOME BUYING TIPS

The Energy Wise Home Buyer
U.S. Government Printing Office
Washington, DC (price: $2.00)
specify stock number - 023-000-00-528-2.

BICYCLES

League of American Wheelmen
P.O. Box 988
Baltimore, MD 21203

APPLIANCE USE

Office of Consumer Affairs
Association of Home Appliance Manufacturers
20 N. Wacker Drive
Chicago, IL 60606

"The Energy Puzzle: How to Fit In" is a 41-page publication of the Alliance to Save Energy, 1925 K Street NW, Washington, DC, 20006 (202-857-0666). Copies of this well-written and colorfully illustrated booklet are available for $.25 each.

The U.S. Department of Housing and Urban Development, 45 Seventh Street, SW, Washington, DC, 20410, published in September, 1979, a leaflet, "Be an Energy Miser in Your Home." This publication describes briefly 18 actions that can be taken to save energy at home.

NEWSLETTERS

To help you keep up-to-date about energy information and new materials and programs in energy education, you will find the free materials listed below very helpful:

1. Energy Conservation/Education FACT SHEET
   ERIC/SMEAC
   1200 Chambers Room, 3rd Floor
   Columbus, OH 43212

2. Energy and Education
   National Science Teachers Association
   1742 Connecticut Avenue, NW
   Washington, DC 20009
   (202) 265-4150

3. Energy Insider
   Department of Energy
   Mall Stop GA-343
   Washington, DC 20585

4. Arizona Energy Education
   Department of Physics
   Arizona State University
   Tempe, Arizona 85281

BIBLIOGRAPHY

Coal Minicourse, National Science Foundation, Pre-college Teacher Development in Science Program the Geosciences Today, Purdue University, Department of Geosciences, West Lafayette, Indiana 46907. Dr. Gerald H. Krockover - Director of Program

How a Bill Becomes a Law to Conserve Energy, developed by National Science Teachers Association under DOE contract #EX-76-C-10-3841. They are available from: U.S. Department of Energy, Technical Information Center, P.O. Box 62, Oak Ridge, Tennessee 37830.

The Minnesota Trial Test Materials, Minnesota Department of Education, 625 Capital Square Building, St. Paul, Minnesota 55101, Tom Ryerson - Director of Program

Energy Management Strategies for Colorado Home Economics Teachers, developed by the Colorado State Board of Community Colleges and Occupational Education, by the Public Service Company of Colorado and by Energy and Man's Environment of Portland, Oregon.

Energy Conservation: In the Home and On the Farm, developed by the Pennsylvania State University, College of Agriculture, Department of Agriculture Education, University Park, Pennsylvania in cooperation with Agricultural Education Section, Bureau of Vocational Education, Department of Education, Harrisburg, Pennsylvania and The Pennsylvania Farm Electrification Council - 1980.

Energy - Environmental, Mini-Unit Guide, a product of the NSTA (National Science Teachers Association) Materials Project, John M. Fowler, Director.